

Formulation, Evaluation and Shelf Life of Chickpea Coffee

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Abstract

Chickpea is considered as healthy vegetarian food due to its beneficial nutritional profile and medicinal properties. Coffee consumption does not always provide protective benefits because over drinking is associated with negative impact or risk on our health. Coffee consumption reduces appetite levels for food, increases serum cholesterol, cause insomnia and restlessness, breast tissue cysts in women, incontinence digestive disorders, less hearing loss improvement and risk of headaches. To avoid health risks of coffee and to overcome addiction from coffee, roasted chickpea can be used as a substitute to caffeinated coffee. Hence the present study was done to formulate roasted chickpea powder and evaluating its physicochemical properties, nutrient content, over all acceptability of chiffee (chickpea coffee) made by different methods compared with standard coffee and to assess the shelf life of chiffee powder. Results showed that chiffee prepared by filter method was highly acceptable and statistical analysis did not show significant difference for boiling and filter method chiffee. Percolated chiffee shows significant difference at 5% level when compared with standard coffee. Shelf life evaluation showed that microbial load was within the safe limit up to 35 days.

Keywords: Chickpea Coffee, Chiffee, Coffee, Coffee Substitute

1. Introduction

Coffee alone has no food value, but it does furnish a certain amount of stimulation of caffeine which raises the blood pressure and stimulates renal activity and momentarily masks fatigue. Tannin another alcohol present interferes with digestion¹. When administered in high doses the substance may cause various side effects, related to abnormal stimulation of the central nervous system, decrease tonus of the lower esophageal sphincter, as well as increase risk of miscarriage and intrauterine growth retardation². Caffeine increases the amount of acid in the stomach and may cause heartburn or upset stomach. Caffeine in large amounts may inhibit absorption of iron, zinc and interferes with absorption and metabolism of calcium. This can contribute to bone thinning (osteoporosis) and too much caffeine may cause the muscles to twitch³.

Chickpea (*Cicer arietinum* L.) is an important pulse crop grown and consumed all over the world, especially in the Afro-Asian countries. It is a good source of carbohydrates and protein and the protein quality is considered to be better than other pulses⁴. Chickpea is considered as healthy vegetarian food due to its beneficial nutritional profile and medicinal properties. Indeed, the chemical composition of chickpea flour shows that the seed is a good and inexpensive source of proteins, dietary fiber, carbohydrates and vitamins⁵. Polysaccharides from chickpea were found to have ACE (Angiotensin-Converting Enzyme) inhibitory activity⁶.

So, based on all these facts and to avoid health risks of coffee, the present study was undertaken to formulate chickpea coffee powder (chiffee powder), organoleptic evaluation of chiffee prepared by different methods, to assess nutrient content, conduct antioxidant assay and

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determine the shelf life of formulated chiffee powder in glass container.

2. Materials and Methods

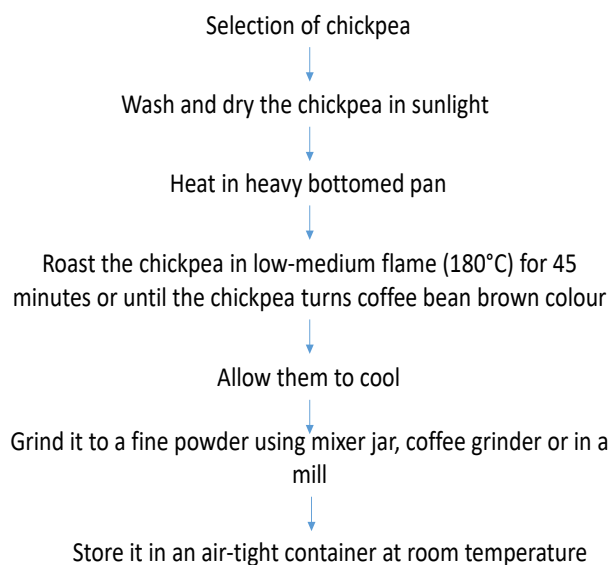
2.1 Source of Material

The chickpea was purchased from the local market in Tiruppur, Tamil Nadu, India and checked for its quality which is free from small, damaged and off coloured seeds and foreign materials.

2.2 Processing of Chickpea

Chickpeas are processed to yield chiffee powder. Chiffee powder is used as a substitute for coffee powder in preparing coffee.

Processing of chickpea



2.4 Preparation and Evaluation of Chiffee

Chiffee powder was used to prepare chiffee by different methods like boiling method, filter method and percolation method and they were subjected to sensory evaluation and also compared with standard coffee. For organoleptic evaluation, nine point hedonic scale was used to test the parameters like appearance, color, taste, flavor and consistency of chiffee and two sample difference test for chiffee made on 5th and 50th day chiffee powder were evaluated with the help of 25 semi

trained panel members. Nutrients like protein, calcium, phosphorus, zinc, manganese, iron, antioxidants and phytochemicals like flavonoid and tannin were analyzed in chiffee decoction per 100 ml by standard procedures. Physicochemical properties were evaluated in chiffee powder by standard procedures. Chiffee powder was stored in glass airtight container at room temperature and tested for their microbial load on 5th and 35th day of storage. The data obtained from organoleptic evaluation was analyzed statistically by mean, standard deviation, t-test and F-test.

3. Results and Discussion

3.1 Physicochemical Properties of Chiffee Powder

The yield of 100 g chickpea after processing was 80 g due to moisture loss and loss of their strength and toughness. Physicochemical properties such as ash and total dissolved solids of chiffee were 3.5% and 30% which was similar to coffee. Ash content of coffee was 3.4–4.9% and total dissolved solids were 20–37%. The moisture in chiffee was 0.05% and in coffee it was between 0.3 and 5.6⁷. The pH range of chiffee powder was 5.2–5.4 which was nearer to coffee's pH range 4.8–5.3. Water holding capacity of chiffee was 1.4%. Bulk density of chiffee powder was 0.76, higher than the bulk density of coffee which was between 0.2–0.5⁸. True density and porosity of chiffee powder were 1.25% and 39.2% respectively.

3.2 Nutrient Content of Chiffee Decoction

The nutrient content of chiffee decoction was compared with coffee decoction was shown in Table 1.

The nutrient content of chiffee was comparatively higher than that of coffee. Further, it was noted that the phosphorus (48 mg) content was the highest followed by calcium (14.1 mg) in chiffee decoction compared to coffee decoction.

3.3 Antioxidant Assay and Phytochemicals in Chiffee

The 10 ml chiffee decoction contains 37.5% DPPH scavenging activity. The calculated inhibition concentration (IC₅₀) for DPPH scavenging activity of chiffee decoction was 13.2 ml. In 100 ml chiffee

Table 1. Nutrient content in chiffee decoction

Nutrients	Nutrient content (per 100 ml decoction)	
	Chiffee	Coffee
Protein (gm)	0.58	0.14
Phosphorus (mg)	48	3.56
Calcium (mg)	14.1	1.65
Iron (mg)	0.36	0.05
Zinc (mg)	0.19	-
Manganese (mg)	0.09	0.02

Table 2. Comparison of mean organoleptic scores of chiffee prepared by different methods

Criteria	Mean \pm standard deviation			
	Standard coffee	Chiffee		
		Boiling method	Filter method	Percolation method
Appearance	9 \pm 0	9 \pm 0.20	9 \pm 0	8.88 \pm 0.33
Colour	8.92 \pm 0.27	8.96 \pm 0.20	9 \pm 0	8.56 \pm 0.65
Flavour	8.76 \pm 0.43	8.48 \pm 0.58	8.92 \pm 0.27	8.2 \pm 0.70
Taste	8.76 \pm 0.43	8.36 \pm 0.56	8.84 \pm 0.47	8.12 \pm 0.60
Consistency	9 \pm 0	9 \pm 0	9 \pm 0	8.88 \pm 0.33
Overall acceptability	8.88 \pm 0.12	8.76 \pm 0.31	8.95 \pm 0.07	8.52 \pm 0.36
Groups compared		C ^S & C ^B	C ^S & C ^F	C ^S & C ^P
't' value		1.20 ^{NS}	1.43 ^{NS}	2.98*
Groups compared		C ^B , C ^F & C ^P		
'F' ratio value		2.88 ^{NS}		

C^S – Standard coffee, C^B – Chiffee prepared by boiling method

C^F – Chiffee prepared by filter method C^P – Chiffee prepared by percolation method NS- Not significant & *Significant at 5% level

decoction, the amount of tannin is about 1.7 mg Tannic acid equivalents and the amount of flavonoids is about 2.5 Catechin equivalents.

3.4 Organoleptic Evaluation of Chiffee

Data pertaining to the proximate mean acceptability scores obtained through organoleptic evaluation of

standard coffee and chiffee prepared by different methods is shown in Table 2 and Figure 1.

The overall acceptability of chiffee prepared by filter method was the highest followed by standard coffee, chiffee prepared by boiling method and percolation method. On comparing the overall acceptability among chiffee prepared by different methods, filter method was highly acceptable than the other methods.

Table 3. Mean organoleptic evaluation of chiffiee after storage

Criteria	Mean \pm standard deviation Chiffiee	
	5 th day	50 th day
Color	8.68 \pm 0.55	8.96 \pm 0.2
Flavor	8.44 \pm 0.58	8.56 \pm 0.58
Taste	8.44 \pm 0.58	8.52 \pm 0.71
Consistency	8.96 \pm 0.2	8.96 \pm 0.2
Overall acceptability	8.68 \pm 0.24	8.79 \pm 0.23
t value	2.41 ^{NS}	

NS - Not significant

Statistical analysis of t value of overall acceptability of chiffiee prepared by various methods compared with standard coffee showed that chiffiee made by boiling and filter method did not show any significant difference with standard coffee. Whereas, when chiffiee made by percolation method was compared with standard coffee, it showed significant difference at 5% level.

On statistical analysis for overall acceptability of F ratio value between chiffiee prepared by boiling, filter and percolation method did not show any significant difference. The overall acceptability of chiffiee prepared with 5 days old and 50 days old chiffiee powder is presented in Table 3 and Figure 1.

The mean difference of appearance, color, flavor, taste and overall acceptability of chiffiee prepared after 50 days storage of chiffiee powder showed slightly higher mean scores than the chiffiee prepared after 5 days of storage of chiffiee powder and the mean score for consistency was similar in both. It is noted that on storage, color and flavor of chiffiee had improved and it was predicted in overall acceptability. However statistical analysis of t value did not show any significant difference.

The flavor difference between two chiffiee samples prepared on 5th day and 50th day old chiffiee powder is shown in Table 4.

Table 4. Two sample difference test for chiffiee prepared by filter method

Degree of difference	Direction									
	Superior				Equal		Inferior			
	5 th day		50 th day		5 th day	50 th day	5 th day		50 th day	
	N	%	N	%	N	%	N	%	N	%
0	-	-	-	-	8	32	-	-	-	-
1	4	16	2	8	-	-	2	8	4	16
2	-	-	-	-	-	-	-	-	-	-
3	3	12	8	32	-	-	4	16	3	12
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
Total (N = 25)	7	28	10	40	8	32	10	40	7	28

0-No difference 1-Very slight difference 2-Slight difference 3-Moderrate difference 4-Large difference 5-Very large difference

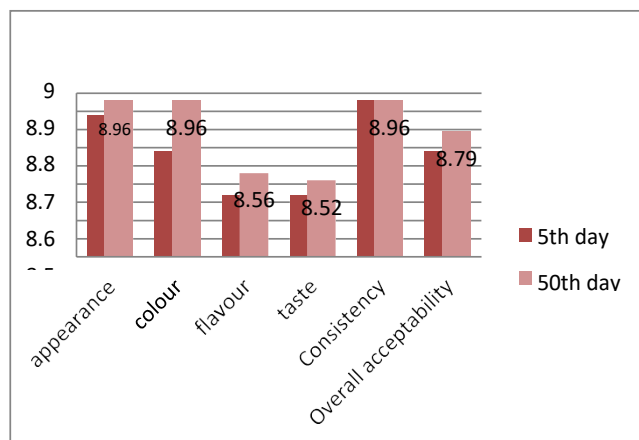


Figure 1. Sensory evaluation of chiffee on 5th day and 50th day.

Two sample difference test carried out in chiffee on 5th day revealed that majority (40%) reported inferior. However after 50 days of storage majority (40%) reported superior with moderate difference. Further 32% of subjects were not able to differentiate any difference between chiffee on 5th and 50th day. After 50 days of storage, 8% and 32% of the subjects reported very slight and moderate difference respectively superior to 5th day chiffee. On storage, the color of the chiffee powder was improved and this may be the reason for improved flavor and the higher acceptability of 50th day chiffee.

3.5 Shelf Life of Chiffee Powder

The total bacterial count of chiffee powder on 5th day was 9 cfu/g and on 35th day it was 25 cfu/g. The bacterial count increased slightly as the days of storage increased.

4. Conclusion

The study concluded that chiffee is a good substitute for coffee lovers and also has a good nutritional value and low tannin compared to coffee. From the organoleptic evaluation it is evident that chiffee's color, flavor, taste, consistency and overall acceptability is nearly similar to coffee. Filter method chiffee is highly acceptable followed

by boiling and percolation method. Also, the flavor of chiffee powder improved on storage and the storage stability of chiffee powder on 35th day was normal. From the nutrient analysis, it is noted that the chiffee decoction contains high amount of phosphorus and calcium and a fair amount of protein and trace amount of iron, zinc and manganese.

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